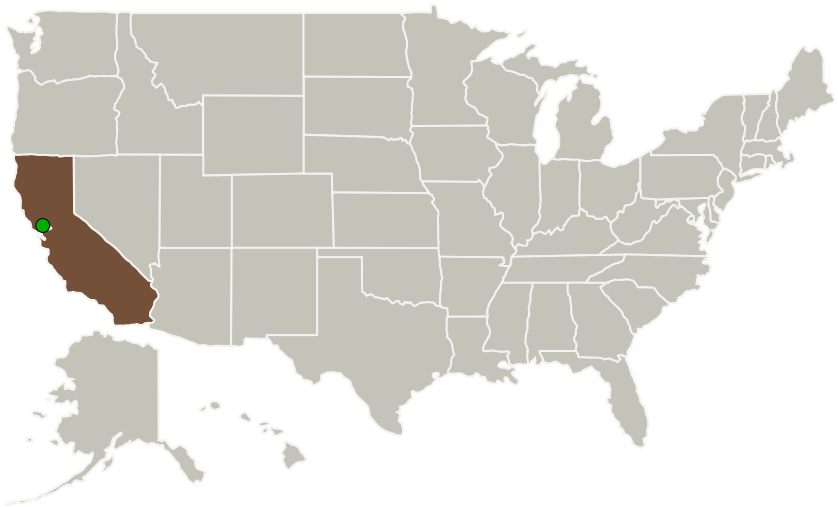
A Compact Sensor with Multiple In-Situ Sensing Capabilities, Phase I

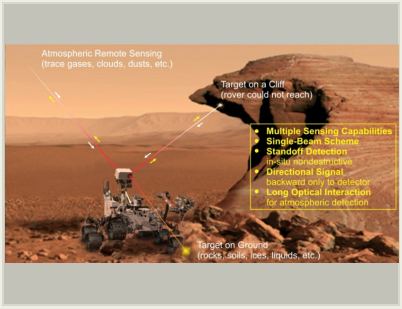
Completed Technology Project (2013 - 2013)

Project Introduction

Planetary rocks, soils, liquids and atmospheric gases are ideal targets for scientists to study the possibility of life existence and the habitability, nature and evolution of planetary systems. Currently, NASA uses different sensing technologies to analyze planetary samples. The use of multiple instruments increases the weight, complexity, power consumption as well as the probability of system malfunction. It is critical to develop lightweight miniaturized multi-functional sensor to enable NASA's multiple-mission needs and therefore make the best use of limited resources by reducing the cost, size, and the number of instruments. Crystal Research Inc. (CRI) proposes a novel compact optical sensor with multiple in-situ sensing capabilities for measurements of various inorganic and organic samples for planetary study and search of biomarkers. The proposed technique is based on a nonlinear coherent interaction process to detect the backward spectral signals from the targets. The detection is enabled by using our novel electro-optic (EO) switchable spectral filtering technique to eliminate spectral artifacts and nonresonant background. The standoff scheme facilitates the implementation of multiple measurements by using a single sensor for nondestructive analysis of different samples on land surface or in atmosphere. It eliminates the sample preparation process, contamination and other related accessories.

Primary U.S. Work Locations and Key Partners





A Compact Sensor with Multiple In-Situ Sensing Capabilities

Table of Contents

A Compact Sensor with Multiple In-Situ Sensing Capabilities, Phase I

Completed Technology Project (2013 - 2013)

Organizations Performing Work	Role	Type	Location
Crystal Research, Inc.	Lead Organization	Industry	Fremont, California
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations
California

Project Transitions

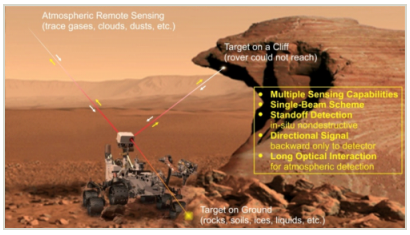
May 2013: Project Start

November 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137810)*

Images



Project Image
A Compact Sensor with Multiple In-Situ Sensing Capabilities
(https://techport.nasa.gov/image/130419)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Crystal Research, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

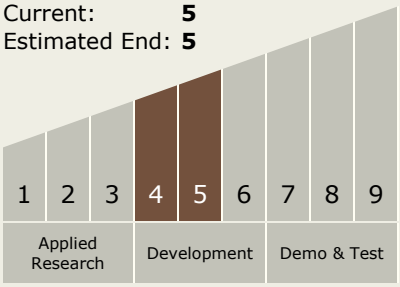
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Pengfei Wu

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



A Compact Sensor with Multiple In-Situ Sensing Capabilities, Phase I

Completed Technology Project (2013 - 2013)

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System